presented from about twenty meteorologists, including Profs. Alexander G. McAdie and Alfred J. Henry, of the Weather Bureau. Considerable time was given to the study of analogous cases of destruction by other tornadoes, such as that of Monville, August 19, 1845; St. Claude, August 19, 1890, and an elaborate study was made of the destruction in the present case, Dijon, June 30, 1901, most of which was evidently due to wind. After three days of pleading, the civil tribunal of Dijon finally rendered the following judgment on the 1st of July, substantially in accord with the opinion of two of the three experts: namely, Galliot, engineer-in-chief of bridges and roads; Pigeon, professor in the faculty of sciences at the University of Dijon; and Julien, civil engineer in Paris.

Notwithstanding the uncertainty of the experts, who have been unable to determine with exactness the amount of destruction due to lightning, on the one hand, and that due solely to the violence of the wind, on the other hand, it is, nevertheless, possible for the Court to pronounce the opinion that it is certain, according to the testimony of the experts, that the lightning and the wind acted almost simultaneously; that it is also certain that if the lightning, striking the building, M, and the shed, N, had not produced in these two structures a weak point, as is shown by the partial destruction of the boards and framework, that the wind would not have had force enough to demolish these two buildings, as was done; that the proof of this fact is also shown by that other testimony that the building, M, and the shed, N, are the only ones injured in the neighborhood of the docks. Other buildings, more or less important and of construction more or less unsubstantial, have suffered no damage, except, perhaps, some tiling displaced, such as the shed at the right of the principal entrance, on the boulevarde Voltaire, and the small administration building just opposite the entrance gate, which were not touched. It must, therefore, be concluded that the lightning stroke and the violence of the wind, by their combined action, had an equal part in the disaster, from which it follows that the responsibility for the disaster should be attributed one-half to the lightning stroke and one-half to the violence of the hurricane.

* * * Considering that the insurance companies have stipulated, in the general conditions printed in their policies, that the insurance covers only damage by fire resulting from lightning, but that, in consideration of a special premium, they are accountable for damages other than those by fire resulting from the stroke or explosion of lightning (the insurance against lightning not including in any case the damage caused by hurricanes, cyclones, tornadoes, or any other meteorological or electrical phenomenon other than thunder or lightning):

Considering, nevertheless, that, by a manuscript clause which is found in all the policies, the company gratuitously makes payment for damage that the stroke or explosion of the lightning, when duly attested, did or could have done to objects insured by the present policy, even when fire does not result:

Considering that it results with certainty from the stipulations above that the companies are responsible for damage other than fire directly due to lightning stroke:

Considering that it has been shown that the cause of the damage occasioned to the buildings and merchandise of the docks was due by one-half to the lightning stroke; that it is, therefore, this part which should be borne by the insurance companies and divided among them according to the proportions stated in their contracts.

* * * For these reasons,

The Court, after deliberating in accordance with the law,

Declares that the damages caused June 30, 1901, both to the buildings M and N of the Society of Docks and to the merchandise and contents, are due one-half to the lightning stroke and the other half to the violence of the wind;

Declares that one-half of the damage thus caused should be borne by the insurance companies, according to the proportions stated in their insurance policies, and with interest from the day of demand.

At the conclusion of this judgment, the two parties came together and adjusted this matter.—*C. A.*

## WEATHER BUREAU MEN AS INSTRUCTORS.

Mr. H. W. Grasse, Assistant Observer, Moorhead, Minn., on July 19, addressed a class from the summer school, explaining the instruments and methods of the Weather Bureau. The summer school is composed chiefly of teachers from the surrounding country.

Mr. H. W. Richardson, Local Forecaster, Duluth, Minn., lectured at that place on July 27, before the teachers attending the summer school, taking as his subject, The Weather Bureau.

Mr. C. W. Strong, Section Director, Oklahoma, Okla., has been appointed on the faculty of Epworth University as instructor in meteorology, Mr. Strong says: "The courses connected with the University are elective, and can be taken up by the students at any time, and in any year's work. The student can take up our particular work and carry it to completion at any time during the four years' period of instruction."

The State College of Kentucky has decided to establish a course of instruction in meteorology, which will be given for the first time during the coming school year. Mr. R. H. Dean, Observer at Lexington, Ky., has been appointed instructor in meteorology, and has been requested to formulate an outline for the course of study. It is probable that the course will be given in connection with the course in agriculture.

Mr. J. W. Bauer, Section Director, Columbia, S. C., on August 9, addressed an audience of about two hundred planters at the annual meeting of the Darlington Agricultural Society. The address was devoted principally to the work of the Weather Bureau as related to agriculture, including the forecast and warning services, and the Climate and Crop Service.

Mr. Merton L. Fuller, Assistant Observer, Springfield, Ill., delivered, during July and August, eight addresses before three of the teachers' institutes of Iowa, having a total attendance of over five hundred teachers, and comprising nearly the entire teaching force of Buena Vista, Calhoun, and Wright counties. The addresses were illustrated by blackboard work, and by twenty specially prepared charts and diagrams. The general circulation of the atmosphere was briefly reviewed; the storms of both tropical and temperate latitudes were described; and the weather of Iowa, as affected by general atmospheric conditions, was discussed in some detail. Thunderstorms and tornadoes formed the subject of one of the lectures and another was devoted to weather forecasting, with a description of the work of the Bureau, and some consideration of common "weather signs" and "long-range" forecasts.

Mr. Richard H. Sullivan, Observer, Grand Junction, Colo., lectured on August 4, under the auspices of the Western Colorado Academy of Sciences, on "Practical Meteorology." The lecture was illustrated by thirty slides, many of which were prepared by the lecturer from text books and the office climatic charts.

## THE HELWAN AND ABBASSIA OBSERVATORIES.

The Survey Department of the Public Works Ministry of Egypt has issued the following notice:

On January 1, 1904, the Observatory, which has hitherto been situated at Abbassia, on the north side of Cairo, was transferred to its new site at Helwan, about 22 kilometers south of Cairo. The buildings are on the limestone rock, which here forms the surface of the desert, and have an open view over the desert to the northeast and south, while on the west is the Nile Valley, the nearest cultivation being 3 kilometers distant.

At present the main building is occupied, and the meteorological equipment, with complete self-registering apparatus, is installed there; also the arrangement for furnishing the noon time-signal, which drops the time balls at Port Said and Alexandria. There is, besides, a new transit house and an equatorial house. The house for magnetic self-registering instruments is not yet completed.

The position of the transit pillar is: Latitude 29° 51′ 33.5″ north, longitude 31° 20′ 30.2″ east of Greenwich. This latter value depends upon the "Venus station," on the Mokattam Hills at Cairo, being longitude 31° 16′ 33.6′ east of Greenwich.

The altitude of the cistern of the barometer above mean sea level at Alexandria is 115.6 meters.

The Abbassia Observatory was established in 1868. It was reorganized in 1900 and equipped with automatic apparatus whose records replaced, to a large extent, the previous tri-

hourly eye readings. The report for 1901, which is the last to be received, gives the data in full, including records of evaporation, earth temperatures up to a depth of 1.15 meters, earthquakes as registered by the Milne seismograph, and solar radiation. This last element, whose determination is facilitated by the comparatively cloudless skies of Egypt, is measured by a Callendar sunshine receiver, which in November, 1901, replaced the ordinary bright and black bulb thermometers in use up to that time.

*Observations at the Abbassia Observatory, 1901.*

| Months. | Temperature, in degrees C. | | | | | Relative humidity. | | | Mean cloudiness, tenths. | Wind. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Velocity in miles per hour. | | Prevailing direction. |
| | Mean. | Max. | Min. | Mean max. | Mean min. | 8 a. m. | 8 p. m. | Min. | | Mean. | Max. | |
| January | 12.1 | 20.5 | 0.4 | 17.1 | 5.8 | 75 | 60 | 25 | 3.8 | 4.6 | 34 | sw. |
| February | 15.5 | 30.2 | 3.2 | 22.8 | 7.8 | 82 | 65 | 10 | 3.6 | 2.9 | 21 | nne. |
| March | 19.0 | 40.4 | 6.0 | 27.0 | 10.5 | 70 | 51 | 4 | 2.1 | 4.7 | 23 | nw. |
| April | 21.1 | 39.4 | 8.4 | 28.7 | 13.0 | 69 | 50 | 6 | 3.0 | 4.4 | 20 | n. |
| May | 24.1 | 43.0 | 11.2 | 31.7 | 15.5 | 54 | 39 | 7 | 3.1 | 5.4 | 21 | ne. |
| June | 27.9 | 42.2 | 15.4 | 35.9 | 19.4 | 58 | 43 | 3 | 1.8 | 4.2 | 18 | n. |
| July | 28.7 | 41.0 | 19.0 | 36.5 | 20.2 | 70 | 42 | 13 | 1.5 | 2.9 | 15 | nw. |
| August | 27.8 | 40.0 | 17.4 | 34.3 | 20.0 | 74 | 52 | 21 | 1.6 | 2.7 | 16 | nw. |
| September | 25.5 | 38.0 | 16.2 | 32.5 | 18.7 | 75 | 61 | 19 | 1.2 | 2.6 | 14 | nw. |
| October | 23.2 | 33.0 | 13.5 | 29.4 | 17.0 | 80 | 65 | 23 | 2.3 | 4.3 | 22 | n. |
| November | 18.9 | 33.6 | 8.7 | 24.5 | 12.5 | 74 | 62 | 15 | 3.2 | 2.6 | 19 | s. |
| December | 14.8 | 27.6 | 5.2 | 21.1 | 8.8 | 81 | 68 | 20 | 3.8 | 2.9 | 24 | s. |
| Year | 21.6 | 43.0 | 10.4 | ..... | ..... | 72 | 55 | 3 | ..... | 3.7 | ..... | n. |

The precipitation for the year amounted to 35.90 millimeters (1.41 inches) and fell on ten different days. There were six months in which no rain fell. During the 15-year period, 1884–1898, the highest temperature was 45.2° C. (113.4° F.), and the lowest —0.7° C. (30.7° F.). The report also contains observations from 12 second order stations, mean values at Wadi Halfa for the decennium ending in 1900, and gage readings from several stations on the Nile.

The Abbassia Observatory was about three miles from Cairo, with the open desert on one side and the highly cultivated Delta of the Nile on the other. The removal to Helwan was made partly for the sake of obtaining a purely desert exposure and partly to establish a magnetic observatory free from the influence of trolley lines and railroads.—*F. O. S.*

## THE HEURISTIC METHOD.

In the article by Prof. J. M. Pernter, a translation of which is published in the MONTHLY WEATHER REVIEW for December, 1903, the author speaks of the heuristic method of discovering a correct method of forecasting. Wherever this word occurred we have translated it variously; namely, as the "discovery method," and again as the "inventive method." From the context, one may easily perceive that "heuristische" refers to that method in accordance with which one invents or devises a method or basis of forecasting, and then endeavors to find agreements between the predictions and the weather that will confirm the forecasts and thus establish the correctness of the principles on which these are based. The word heuristic has generally been used in English to indicate any method by which one discovers unknown laws, but in lieu of any better special word Pernter has adopted this particular application to a method that must be distinguished from the inductive or the deductive.

In the strict, logical, inductive method we first observe many phenomena, such as daily temperatures, pressures, and winds, and from these facts, by various processes of study, we are led to generalizations and hitherto unknown laws, such as the geographic distribution of the diurnal amplitude, the moment of maximum, etc.

In the strictly deductive method, we begin by accepting certain principles or laws, such as the law of inertia or the law of gravitation, or the laws of the conduction of heat; by reasoning upon these by strictly logical or mathematical methods we arrive at their necessary consequences, and thus learn to recognize and accept new laws or hitherto unknown phenomena.

All our progress in science must depend upon the proper application of these three methods of reasoning. Observation and experiment, maps and tables of figures are not the laws of nature, but result from those laws, and we can not pass from this crude data back to the general laws except by adhering to the most rigid logic. Mathematics and even the doctrine of chance are but forms of logic. We are all familiar with the legitimate syllogism, "All B is A; C is B: therefore, C is A." But how many are apt to be misled by the following syllogism: All B is A; C is A: therefore, C is B.—*C. A.*

## THE GALVESTON HURRICANE AND OCEAN WAVE.

Mr. Adolphus Carper, Galveston, Tex., writes to the Chief of the Bureau that he is confirmed in his previous statement that the destructive high water at Galveston on September 8, 1902, must have been due to a combination of wind or hurricane wave, and tidal or oceanic wave. He says this view is not generally accepted in Galveston, but is confirmed by the fact that—

the hurricane came upon the city from the north, having traversed Texas, the ravages of which commenced in Bell County, 218 miles north of Galveston. The tidal wave came from the southwest, from the Gulf, sweeping over Galveston in the face of a hurricane calculated to have had a velocity of 120 miles per hour. It, the tidal wave, vanished as quickly as it came; the gale, still blowing, leaving behind a black ooze of a sickening, disgusting odor. About the end of September a sailing craft arrived in New York Harbor whose captain, in his sworn protest at the custom-house, reported having passed a locality in the Bay of Campeachy about the date of the Galveston disaster showing by its vast disturbed area that a submarine volcanic eruption must have taken place in that spot.

## ARE THE MOVEMENTS OF THUNDERSTORMS DEFLECTED BY THE TIDE?

A letter from Dr. J. Russell Smith, of the University of Pennsylvania, states that unscientific observers believe that the thunderstorms passing near Cape May are deflected up or down the Delaware Bay by the tides, and asks if this is correct, and what is the explanation?

As this was a new idea in meteorology, a letter of inquiry was sent to our station agent at Cape May, Mr. George L. Lovett, who replied, inclosing a diagram showing the paths of storm movements across Delaware Bay, and stating that they are deflected by the tides and not by the winds. According to his diagram, an incoming flood tide generally enters the bay from the southeast and carries thunderstorms northward; an outflowing ebb tide, moving southward, carries thunderstorms southward; during slack water, storms move eastward straight across, irrespective of wind direction and velocity.

The Editor judges that possibly Mr. Lovett's letter expresses a general belief on the part of the inhabitants of Cape May and the adjoining country, but as there is no a priori reason to believe that tides can have any such influence, it seems important that the dates and observations should be put on record. In order to establish such a novel rule, it will not do to pick out a few favorable coincidences, but it is necessary to carefully plot the path of every thunderstorm for a year or more, and then correlate these paths with the tides and winds. Moreover, the temperature of the surface water must be observed, since it is quite plausible that, with an incoming tide and a southerly wind, the surface water on the east side of the bay would have a different temperature from that on the west side, so that the relative evaporation and moisture of the air may influence the development and path of a thunderstorm. The principal difficulty is the correct plotting of the paths of the storms. This can only be done by the cooperation of many